DS FOX®
DAE SUNG E.N.G

Digital Humidity Controller
www.foxeng.co.kr

ISO 9001:2008 Design of practical utility No. 0301508 Registration of desing No. 0316273

User's Manual   Digital Humidity Controller

FOX-1SH(R) (T/H sensor)   FOX-1H (H. sensor)

※·Thank you for selecting our products.
Please read carefully this instruction to reduce any damages or operation mistakes.

Regarding the English – language manual, please download it at our homepage.

① Model Composition

Model	Output	Sensor	Range	RS485 communi.
FOX-1H	1c 250Vac2A	HS220	20%~99%Rh	-
FOX-1SH	1a 250Vac2A	DS-SH series	0%~100%Rh	-
FOX-1SHR	1a 250Vac2A	DS-SH series	0%~100%Rh	Available

② Cautions for your safety

Please read the operating manual throughly before putting the device into operation
※Product specifications and accessories may be changed at any time based on improvements and other reasons.

⚠ CAUTION

1. Pls use this item after installing the duplex safety device in which is applied at dangerous factors such as serious human injury or serious damages of property & important machine because this item is not designed as safety device
2. Do not checking or repairing when it is power on
3. Please check the terminal number before connecting power supply
4. Do not disassembling or opening, remodeling, repairing without any permission

⚠ SAFETY

● Please read the operating manual through completely before putting the device into operation.
● We will not assume any responsibility for damage to assets or persons caused by improper handling or failure to observe the safety instructions or hazard warnings.
● For safety and licensing reasons, unauthorized conversion and/or modification of the device is not permitted.
● Do not exceed the maximum permissible current – in case of higher loads, use a contactor of adequate power. Make sure that the supplied voltage matches the values specified for the instrument.
● The device must be adequately protected from water and dust as per the application and must be accessible via the use of appropriate tools
● The device must not be exposed to extreme temperature, sunlight, strong vibrations or high levels of humidity.
● Operation or installation is not permitted under unfavorable ambient conditions such as wetness or excessive induction loads or solenoid and dust, combustible gases, vapors or solvents, especially high-frequency noise
● Avoid operation or installation close to high-frequency fields such as welding devices, sewing machines, wireless transmitter, radio systems, SCR controller, etc
● Do not install the sensor cable nearby signal cable, power cable, load cable
● Please use the shield cable when the sensor cable's lengthen, however do not make it too much longer
● Please use the sensor cable without any cutting or flaw, blemish.
● The device is not a toy and should be kept away from children
● Installation work must only be carried out by suitably qualified personnel who are familiar with the hazards involved and with the relevant regulations.
● You shouldn't tinker with anything or the product may not be opened or disassembled unless you know what you're doing. Please ask us about this questioning

⚠ Danger

■Caution, Danger of electric shock

● Electric shock - Do not touch AC board during on power because of electric shock.
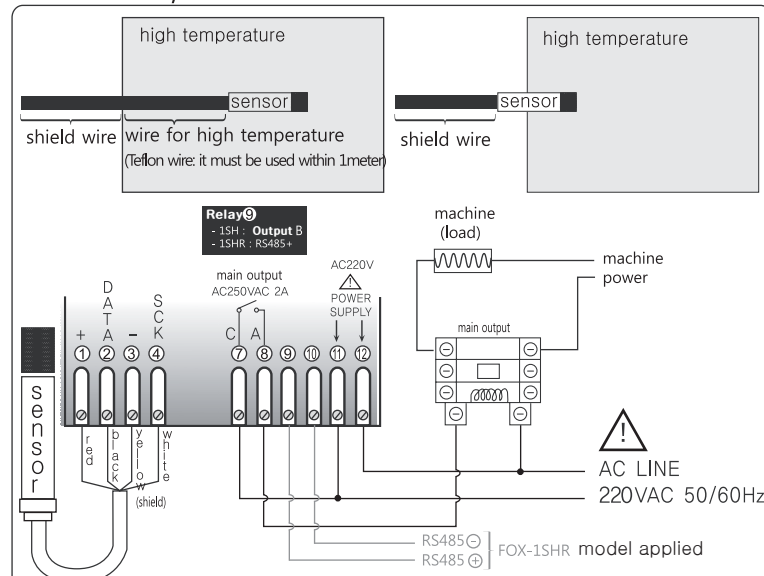● Please intercept the input power surely when turn on power because of electric shock.

③ Part name
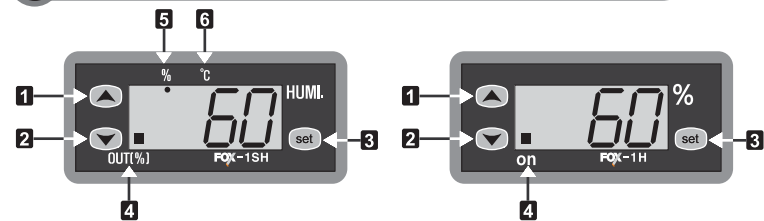
1 Setting(UP)
2 Setting(DOWN)
3 Setting key(SET)
4 Output
5 Humidity display(FOX-1SH(R)model)
6 Temperature display(FOX-1SH(R)model)

FOX-1SH(R) : humidity display and cotrol + temperature display
for the currency status display, there're 3 kinds of mode,
as a switch of <UP(increase), DN(decrease)>,
you can change the display like "Humidity/Humi&Temp/Temp".
FOX-1H : humidity display and control

④ Connection

< FOX-1SH / FOX-1SHR >

high temperature

sensor
shield wire wire for high temperature (Teflon wire: it must be used within 1meter)

high temperature
sensor
shield wire

Relay⑨   -1SH : Output B
           -1SHR : RS485+

main output AC250VAC 2A

DATA + DATA - SCK C A
① ② ③ ④   ⑦ ⑧ ⑨ ⑩ ⑪ ⑫
red black Yellow white (shield)

AC220V POWER SUPPLY

machine (load)
machine power
main output

⚠ AC LINE 220VAC 50/60Hz
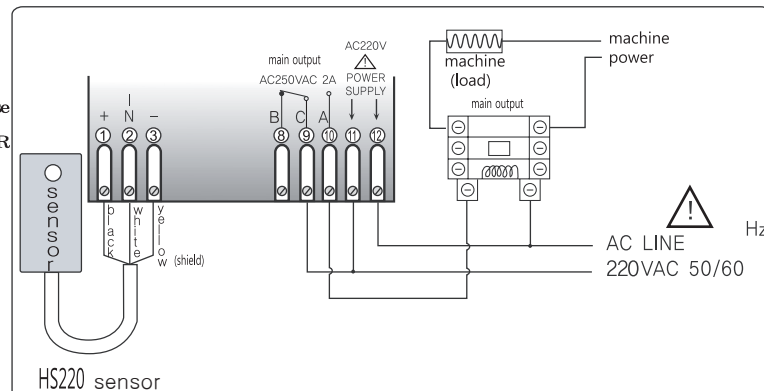
RS485⊖ RS485⊕ FOX-1SHR model applied

DS-SH series sensor

Ref1. Detailed specifications for the applicable sensor specifications, see the back of the '10. sensor's specifications'.
Caution1. Please make use of the shield wire when lengthening of the sensor wire, and in case of using in the high temperature range of 65℃~80℃, surely use the high temperature using wire(Teflon wiring).
Caution2. Please make the operating machine(load) be driven with using the power relay or magnet because its output specification of inside relay is less than 250VAC 2A

< FOX-1H >

main output AC250VAC 2A   AC220V POWER SUPPLY

+ N ~   B C A
① ② ③   ⑦ ⑧ ⑨ ⑩ ⑪ ⑫
black white nip w (shield)

machine power
machine (load)
main output
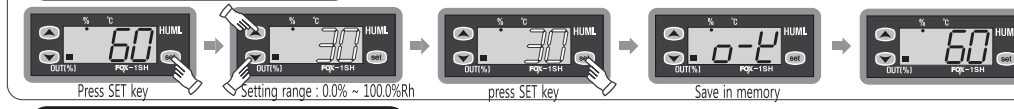
⚠ AC LINE 220VAC 50/60 Hz

HS220 sensor

Ref1. Detailed specifications for the applicable sensor specifications, see the back of the '10. sensor's specifications'.
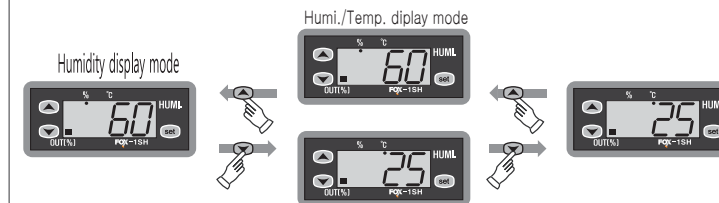Caution2. Please make the operating machine(load) be driven with using the power relay or magnet outside surely because its output specification of inside relay is less than 250VAC 2A

⑤ Setting for programs (FOX - 1SH(R))

User setting humidity

Press SET key → Setting range : 0.0% ~ 100.0%Rh → press SET key → Save in memory
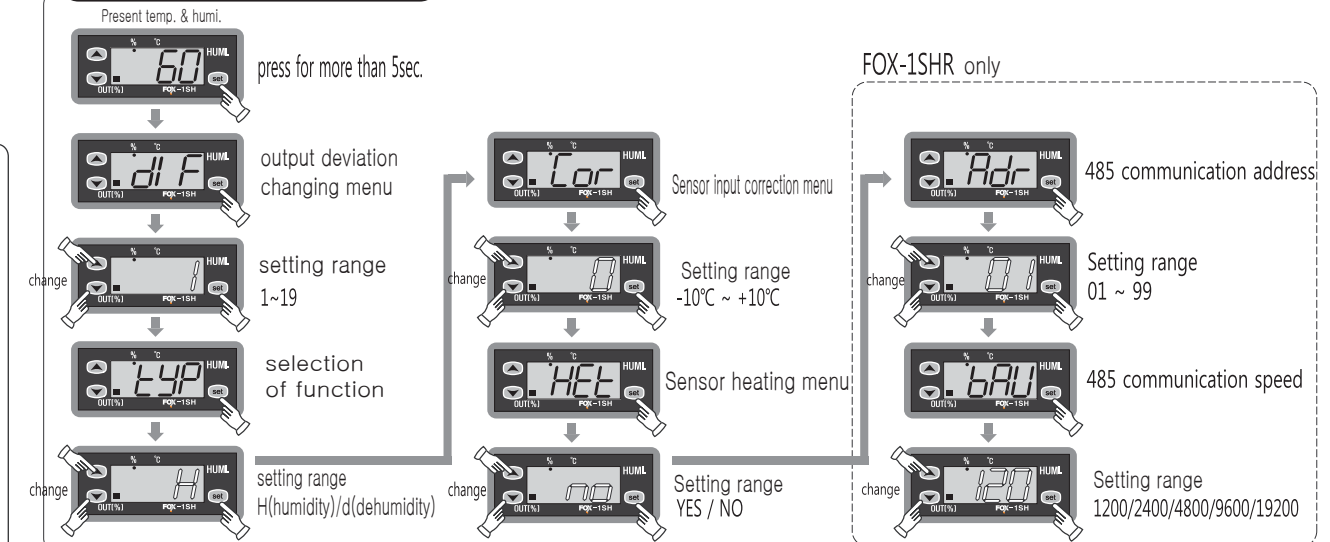
Humi./Temp. mode changing

Humi./Temp. diplay mode

Humidity display mode

Caution1.
This product is a humidity controller, temperature is displayed in add-ons.
The temperature is display only, please note that control is not.

Program setting

Present temp. & humi.

→ press for more than 5sec.
→ dLF output deviation changing menu
→ setting range 1~19
→ tYP selection of function
→ H setting range H(humidity)/d(dehumidity)

change → Cor Sensor input correction menu
→ Setting range -10℃ ~ +10℃
→ HEt Sensor heating menu
→ no Setting range YES / NO

FOX-1SHR only

change → Adr 485 communication address
→ Setting range 01 ~ 99
→ 6.0.0. 485 communication speed
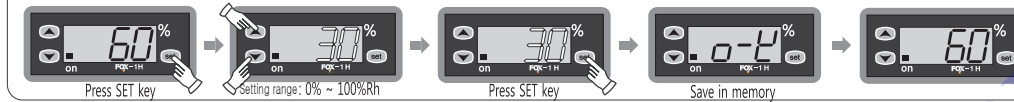→ Setting range 1200/2400/4800/9600/19200

Ref 1. If press for more than 5 sec in the current state, the program setting mode to enter.
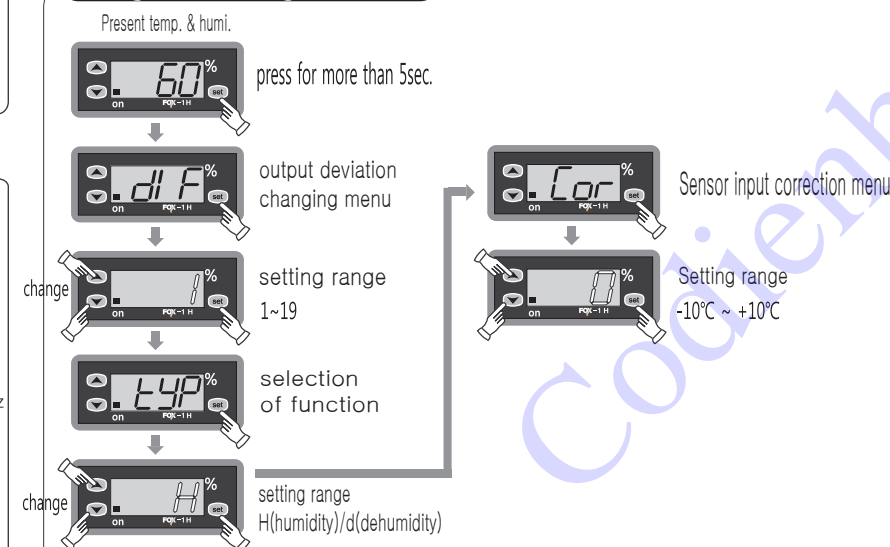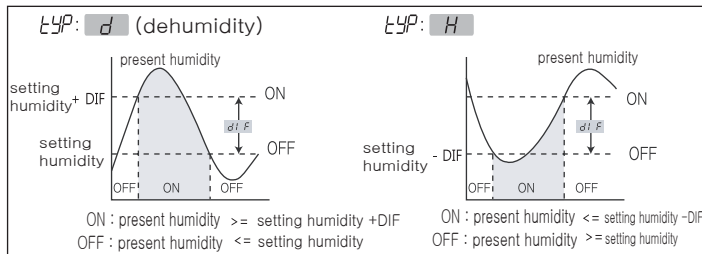Ref 2. All the program after setting, if press for more than 3 sec or after 60 sec, automatically return to the current current of humidity display after displayed O-K.

⑥ Setting for programs (FOX - 1H)

User setting humidity

Press SET key → Setting range : 0% ~ 100%Rh → Press SET key → Save in memory

Program setting

Present temp. & humi.

→ press for more than 5sec.
→ dLF output deviation changing menu
→ setting range 1~19
→ tYP selection of function
→ H setting range H(humidity)/d(dehumidity)

change → Cor Sensor input correction menu
→ Setting range -10℃ ~ +10℃

Ref 1. If press for more than 5 sec in the current state, the program setting mode to enter.
Ref 2. All the program after setting, if press for more than 3 sec or after 60 sec, automatically return to the current current of humidity display after displayed O-K.

7 Detailed explanation

1 dIF Setting for temperature deviation FOX-1H FOX-1SH FOX-1SHR

In the ON/OFF control, it needs at regular interval between ON and OFF.
By operating the ON/OFF control frequently, the relay or its output contact can be damaged quickly and it also occurs the hunting(oscillating, chattering) by virtue of external noise. You can make use of the temperature deviation in order to protect its relay or contact and so on.

2 tYP Selection for function FOX-1H FOX-1SH FOX-1SHR

tYP : d (dehumidity) tYP : H

ON : present humidity >= setting humidity +DIF
OFF : present humidity <= setting humidity

ON : present humidity <= setting humidity -DIF
OFF : present humidity >= setting humidity

3 Cor Correction of the present humidity FOX-1H FOX-1SH FOX-1SHR

Correction function for an discrepancy between the present's display value and the actual value(accurate value)
ex) An actual humidity value is 55.5%RH only, but the present humidity's display value was 57.5%RH
=> You may use this function and can correct the display's humidity value by -2.0%RH

Caution. Actual humidity is validated the performance and accurately calibrated by using the equipment to produce. If an inaccurate equipment calculated on the basis of the actual humidity calibration, it can be caused problems with product operation.

4 HEt Heating element for humidity sensor FOX-1SH FOX-1SHR

It is possible to be covered with dew when the humidity is high,
If the present humidity is 95%RH, it is generated heat inner its sensor in order to prevention of dewy.

YES It is operated the heating function automatically if the humidity is more than 95%RH. It is removed it if the humidity is less than 95%RH

no The heating function will be prohibited.

※ **Caution**-It must be set up "NO" because the heating function can not be used for more than 95%RH

※ R.F) The present temperature's display can be increased a little while operating of the humidity sensor's heating function

5 Adr RS485-communication address setting FOX-1SHR

The product FOX-1SHR supports RS485 communications. when communicating with the master device for mutual recognition is the ability to set the communication address.

6 bAU RS485-communication speed setting FOX-1SHR

when communicating with the master device to the exchange of accurate data must match the communication speed.
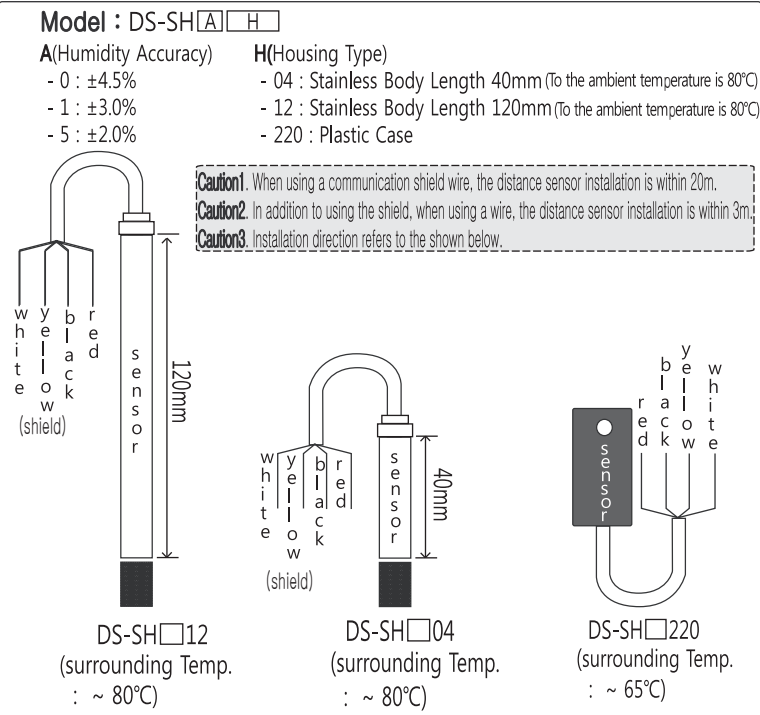
8 Size & dimension

79mm
77mm
35mm

PANEL HOLE

71mm
29mm

77mm
70.5mm

6.5mm
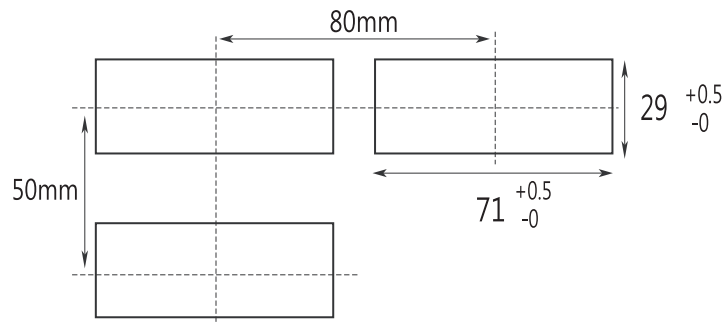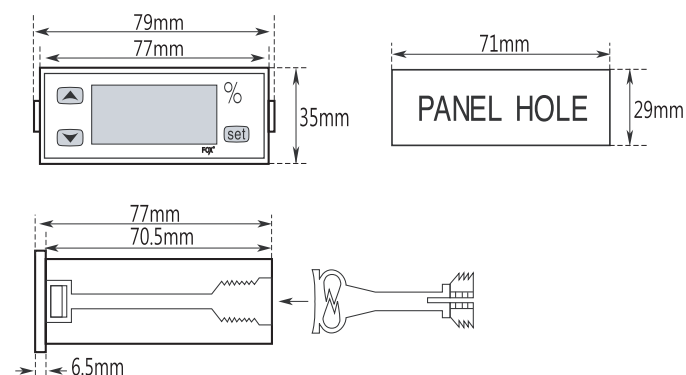
9 Setting range & Set value when deliver

80mm

29 $^{+0.5}_{-0}$

50mm

71 $^{+0.5}_{-0}$

Model		Function	Range	set value when deliver
F O X 1 S H R	F O X 1 S H / F O X 1 H	dIF	1 ~ 19	1
		tYP	H / d	H (humidity)
		Cor	-10 ~ +10	0
		HEt	YES / no	no
		Adr	01~99	01
		bAU	120 : 1200BPS 240 : 2400BPS 480 : 4800BPS 960 : 9600BPS 1920 : 1920BPS	960(9600BPS)

## 10 Sensor's specifications

< DS-SH series > FOX-1SH FOX-1SHR

Model : DS-SH [A] [H]

A(Humidity Accuracy)
- 0 : ±4.5%
- 1 : ±3.0%
- 5 : ±2.0%

H(Housing Type)
- 04 : Stainless Body Length 40mm (To the ambient temperature is 80℃)
- 12 : Stainless Body Length 120mm (To the ambient temperature is 80℃)
- 220 : Plastic Case

Caution1. When using a communication shield wire, the distance sensor installation is within 20m.
Caution2. In addition to using the shield, when using a wire, the distance sensor installation is within 3m.
Caution3. Installation direction refers to the shown below.

DS-SH□12
(surrounding Temp. : ~ 80℃)

DS-SH□04
(surrounding Temp. : ~ 80℃)

DS-SH□220
(surrounding Temp. : ~ 65℃)

< HS220 > FOX-1H

(surrounding Temp. : ~ 60℃)

11 Communication interface (FOX - 1SHR)

specification	in conformity EIA RS485
The method of communication	two wire half-duplex operation
syncronous system	asyncronous system
communication distance	within 1.2Km
communication speed	1200/2400/4800/9600/19200Bps
StartBit	fixed 1bit
StopBit	fixed 1bit
ParityBit	none
DataBit	fixed 8bit
Protocol	BCC

1 System
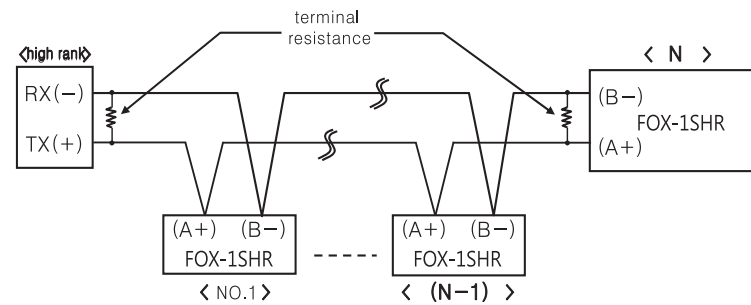
2 Definition between communication command and block

< Show the format of the command >

STX	10¹	10⁰	R/W	X/D	T	P	0	ETX	BCC

START CODE | ADDRESS CODE | HEADER CODE | END CODE | BCC CODE
calculation range of the BCC
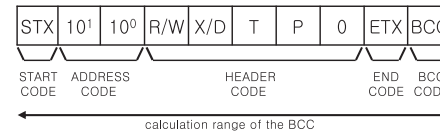
< Show the format of the response >

STX	10¹	10⁰	R/W	X/D	T	P	0				a decimal point	error	output	ETX	BCC

START CODE | ADDRESS CODE | HEADER CODE | Humidity data | END CODE | BCC CODE
calculation range of the BCC
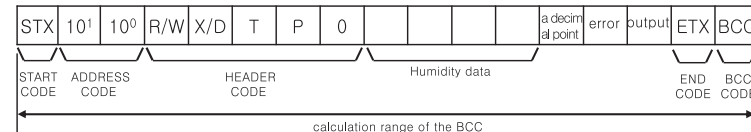
① **START CODE**
Show the lead(head) of the block
STX → [02H]

② **ADDRESS CODE**
A high rank system can discriminates the channel code number among FOX−1SHR. It is available to set between 01 and 99(BCD ASCII)

③ **HEADER CODE :** Show the command name as an alphabetic letter
RX (reading demand) → R[52H], X[58H]
RD(reading response)→ R[52H], D[44H]
WX (writing demand) → W[57H], X[58H]
WD(writing response) → W[57H], D[44H]
TP0(temperature measuring value) → T[54H], P[50H], 0[30H]

④ **Composition of data :** Data is displayed as "Hexa decimal"

⑤ **Decimal point −** 0[30H] there is no "decimal point"
　　　　　　　　　1[31H] there is "decimal point"

⑥ **Error−** 0[30H]: there is no "error"
　　　1[31H]: interrupted of the sensor's cable
　　　2[32H]: low error
　　　3[33H]: high error

⑦ **Output−** 0[30H]: output OFF // 1[31H] :output ON

⑧ **END CODE :** show the end(close) of the block   ETX → [03H]

⑨ **BCC :** (Black Check Character)
Show the XOR arithmetic and logic values from the start(STX) to the ETX

▪ the others : As of no response of the ACK
① in case of not equivalent to the channel after receiving STX
② in case of generating the receive buffer overflow
③ in case of not equivalent to the communication's set values or baud rate

▪ treatment : in case of no response of the ACK
① check the cable
② check the communication's condition(set values)
③ if the main cause of the status is the noise, try to do communication practicing 3times until recovering normally
④ change the communication speed in case of bring about the communication's error frequently

12 Application for humidity controller

1 ex) a dehumidifier −> turn off at 43%RH, turn on at 47%RH
How to operate (setting for the humidity & programs) ?

User's setting humidity changing : 43%Rh   Program setting tYP : d dIF : 4%Rh
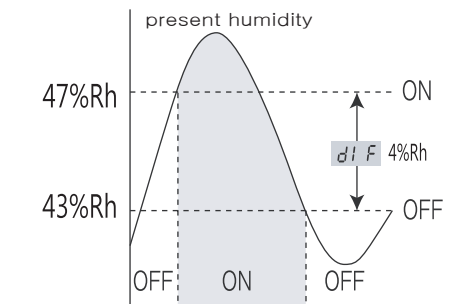
2 ex) a humidifier −> turn off at 43%RH, turn on at 40%RH
How to operate (setting for the humidity & programs) ?

User's setting humidity changing : 43%Rh   Program setting tYP : H dIF : 3%Rh
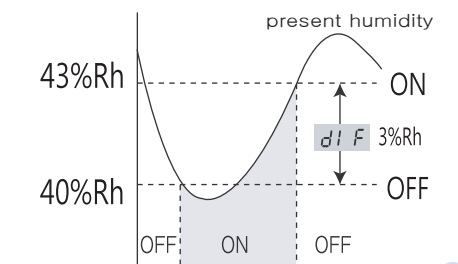
13 Error message

▪ $Er\,1$ - Memory error. Turn the power off and turn it on again.
　　　If the error message persists, please request us A/S by return.

▪ $o-E$ - Sensor error. The sensor is interrupted. Check the cable.

▪ $S-E$ - Sensor error. The sensor is short-circuited. Check the cable.

※ The product's specification can be changed without any notification to improve its quality.